SCANNING IN WIRELESS NETWORKS

FIELD

[0001] The invention relates to the field of wireless networks and, particularly, to facilitating scanning for a wireless network.

BACKGROUND

[0002] In a wireless communication system, a terminal device scans for available wireless networks before selecting a wireless network to connect with. Depending on the system specification, the scanning may be carried out by passively scanning for any scanning messages transmitted by wireless networks or actively by transmitting a request message obliging wireless networks to respond with a response message. Expediting the scanning phase naturally expedites the connection establishment.

BRIEF DESCRIPTION

[0003] According to an aspect of the present invention, there is provided a method as specified in claim **1**.

[0004] According to another aspect of the present invention, there is provided an apparatus as specified in claim **17**.

[0005] According to another aspect of the present invention, there is provided an apparatus as specified in claim **34**.

[0006] According to yet another aspect of the present invention, there is provided a computer program product embodied on a computer readable distribution medium as specified in claim **35**.

[0007] Embodiments of the invention are defined in the dependent claims.

LIST OF DRAWINGS

[0008] Embodiments of the present invention are described below, by way of example only, with reference to the accompanying drawings, in which

[0009] FIG. **1** illustrates communication scenario to which embodiments of the invention may be applied;

[0010] FIG. **2** illustrates a process for maintaining transmission rate of scanning messages according to an embodiment of the invention;

[0011] FIGS. **3** and **4** illustrate embodiments for monitoring the transmission rate of the scanning messages according to some embodiments of the invention;

[0012] FIG. **5** illustrates an embodiment for maintaining the transmission rate of enabling messages according to an embodiment of the invention;

[0013] FIG. **6** illustrates a flow diagram of a process for prioritizing scanning messages when maintaining the transmission rate of the scanning messages according to an embodiment of the invention;

[0014] FIG. **7** illustrates a procedure for determining the type and contents of the scanning message according to an embodiment of the invention;

[0015] FIG. **8** illustrates an embodiment for reducing signalling overhead; and

[0016] FIG. **9** illustrates a block diagram of an apparatus according to an embodiment of the invention.

DESCRIPTION OF EMBODIMENTS

[0017] The following embodiments are exemplary. Although the specification may refer to "an", "one", or "some" embodiment(s) in several locations, this does not necessarily mean that each such reference is to the same embodiment(s), or that the feature only applies to a single embodiment. Single features of different embodiments may also be combined to provide other embodiments. Furthermore, words "comprising" and "including" should be understood as not limiting the described embodiments to consist of only those features that have been mentioned and such embodiments may contain also features/structures that have not been specifically mentioned.

[0018] A general architecture of a wireless communication system to which embodiments of the invention may be applied is illustrated in FIG. **1**. FIG. **1** illustrates wireless communication devices forming wireless networks that may be referred to as service sets. A basic service set (BSS) may be defined by a group of wireless communication devices comprising an access point (AP) **102**, **104**, **106** and one or more terminal stations (STA) **110** communicating with one of the access points **102**, **104**, **106** depending on with which BSS the STA associates to for frame transmission. The BSS is a basic building block of an IEEE 802.11 wireless local area network (WLAN), and it may have a determined coverage area defined by the coverage area of the AP **102**, **104**, **106**, for example. The most common BSS type is an infrastructure BSS that includes a single AP together with all associated, non-access-point STAB. The AP may be a fixed AP as AP **102**, **104**, or it may be a mobile AP as AP **106**. The APs **102**, **104**, **106** may also provide access to other networks, e.g. the Internet. In another embodiment, at least one of the BSSs, is an independent BSS (IBSS) or a mesh BSS (MBSS) without a dedicated AP, e.g. the communication device **106** may in such an embodiment be a non-access-point terminal station. Yet another embodiment of the service set is an extended service set (ESS) which may be defined as a set of one or more interconnected BSSs that appear as a single BSS to the STAB. For example, any one of the APs **102**, **104**, **106** may belong to an ESS comprising a plurality of APs.

[0019] While embodiments of the invention are described below in the context of the above-described topologies of IEEE 802.11, it should be appreciated that other embodiments of the invention are applicable to networks based on other specifications, e.g. WiMAX (Worldwide Interoperability for Microwave Access), UMTS LTE (Long-term Evolution for Universal Mobile Telecommunication System), and other networks having cognitive radio features, e.g. transmission medium sensing features and capability to adopt operational parameters to enable coexistence with radio access networks based on different specifications and/or standards.

[0020] The BSSs are represented by the APs and/or STAB connected to each other, thereby establishing a BSS. The STA **110** may establish a connection to any one of the APs **102**, **104**, **106**. The connection establishment may include authentication in which an identity of a STA is established in the AP. The authentication may comprise exchanging an encryption key used in the BSS. After the authentication, the AP and the STA may carry out association in which the STA is fully registered in the BSS, e.g. by providing the STA with an association identifier (AID) for frame transmissions.

[0021] The APs **102** to **106** may establish a signalling interface for exchanging any information relevant for the coexistence of the APs **102** to **106**. An AP may provide the other APs information on its communication parameters, information on other BSSs the AP has discovered and their communication parameters, etc. In some embodiments, at least some of